

FINAL SUBMITTAL



# **GLENNALLEN TO PALMER SPUR LINE SOILS STUDIES**

## **VOLUME 2 OF 2 APPENDICES**

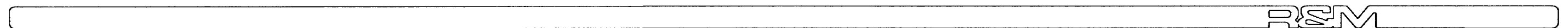
CONTRACT NO. 06-0410

Prepared For:

**ALASKA DEPARTMENT OF REVENUE  
ALASKA NATURAL GAS DEVELOPMENT AUTHORITY**

411 West 4<sup>th</sup> Avenue  
Anchorage, Alaska 99501

October, 2005



**R&M CONSULTANTS, INC.**

**FINAL SUMITTAL**

**GLENNALLEN TO PALMER SPUR LINE  
SOILS STUDIES**

Volume 2 of 2  
APPENDICES

*Prepared for:*

**STATE OF ALASKA  
DEPARTMENT OF REVENUE  
ALASKA NATURAL GAS DEVELOPMENT AUTHORITY**  
411 West 4<sup>th</sup> Avenue  
Anchorage, Alaska 99501

Contract No. 06-0410

*Prepared by:*

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9101 Vanguard Drive  
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R&M Project No. 1291.01

October, 2005

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**APPENDIX A**

**ROUTE SOIL CONDITIONS**

Title Sheet ..... Title 1  
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STATE OF ALASKA  
DEPARTMENT OF REVENUE

ALASKA NATURAL GAS DEVELOPMENT AUTHORITY

GLENNALLEN TO PALMER SPUR LINE  
SOILS STUDIES

CONTRACT NO. 06-0410

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R&M PROJECT NO. 1291.01

LIST OF DRAWINGS	
TITLE/DESCRIPTION	DRAWING NO.
TITLE SHEET	TITLE I
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								SCALE IN FEET		DRAWING NO.	REV.
								TITLE I OF I		I	

SPECIFICATIONS  
DESIGNED BY  
CHECKED BY  
COMPUTER DESIGNATION  
PROJECT 1291.01  
GAS 1291-01  
TITLE 1-1  
10/14/05  
at 16:51  
by cdb

XREF: 905-BD01

SPECIFICATIONS	DESIGNED BY
STANDARDS	CHECKED BY
COMPUTER DESIGNATION	DRAFTED BY
PROJECT# 1288 013648941042-04e08/12/25/0001-093/1.3465	at 15:42 by cdb

TERRAIN UNIT SYMBOL	TERRAIN UNIT NAME	TOPOGRAPHY AND AREAL DISTRIBUTION	SOIL STRATIGRAPHY	SLOPE CLASSIFICATION	PROBABLE UNIFIED SOIL TYPES	DRAINAGE AND PERMEABILITY	EROSION POTENTIAL	GROUND-WATER TABLE	PROBABLE PERMAFROST DISTRIBUTION	FROST HEAVE POTENTIAL	THAW SETTLEMENT POTENTIAL	BEARING STRENGTH	SLOPE STABILITY	SUITABILITY AS SOURCE OF BORROW
Bx	Bedrock	High elevation mountain areas and steep slopes along rivers.	Angular blocks of rock with some sand and silt overlying bedrock	Steep to near Vertical	Bedrock	Poor to Good Low to High	Low	Deep	Unfrozen to Discontinuous	Low to High	Low	High to Very High	Moderate to High	Good to Excellent
C	Colluvium	Gravity transported material on gentle to steep slopes	Various mixtures of sand, silt & gravel with scattered cobbles and some organics.	Gentle to Steep	GM, SM, ML, GW, SW	Moderate to Good Low to High	Low to High	Shallow to Deep	Sporadic to Generally Frozen	Low to High	Low to High	Low to High	Moderate to High	Poor
Cf	Colluvial Fan Deposits	Steep cone shaped deposits formed where intermittent steep streams containing debris flow onto flatter surfaces	Highly variable layers of silts, sands, gravels and organics with boulders	Moderate to Steep	GM, SM, ML, OL	Moderate to Good Low to High	Moderate to High	Shallow	Sporadic	Low to High	Low to High	Moderate to High	Moderate	Poor to Fair
Cl	Landslide	Hummocky unconsolidated deposits of failed soils and bedrock.	Rock rubble, large rock masses, and soils (silty gravels, and sandy silts with possible crude contorted layers). Larger failures occur in shales and mudstones.	Moderate to Steep	GW, SW, SM, GM, ML	Poor to Good Low to High	Moderate to High	Shallow	Sporadic	Moderate to High	Moderate	Moderate	Moderate (Low where oversteepened)	Poor
Cs	Solifluction Deposits	Smooth, moderate to steep slopes on till plains.	Unsorted gravelly sandy silt and gravelly silty sand with faint contorted layering.	Moderate to Steep	GM, SM, ML	Poor Poor	Moderate to High	Shallow (Perched)	Discontinuous to Generally Frozen	High	High	High when frozen, Low when thawed	Low	Poor
Ct	Talus	Gravity transported deposits most frequently found at the base of steep bedrock slopes as coalescing cones and fans.	Angular frost cracked blocks of rock with some silt and sand.	Moderate to Steep	GW, SW	Good High	Low	Deep	Generally Absent to Sporadic	Low	Low	Moderate to High	Moderate (Low where oversteepened)	Fair to Good
El	Loess	Generally flat to very gentle surfaces with channels, circular pits, and terrace scarps; wide spread in the Palmer area.	Silt with some sand and slightly layered	Gentle	ML	Good Moderate	High	Deep	Generally Absent	High	Moderate	Moderate	High (Low where oversteepened)	Poor
Es	Eolian Sand	Low ridges or dunes and on generally flat, terraced, and/or pitted surfaces: common in the Palmer area.	Sand w/some silt	Gentle	SP, SM	Good High	Moderate	Deep	Generally Absent	High	Low	Moderate	High (Low where oversteepened)	Fair to Good

[illegible]

KEYREF: 1291-AIRPHOTOS. 1291-BD02. 1291-USGS-IMAGE. SID

SPECIFICATIONS	DESIGNED BY
STANDARDS	CHECKED BY
COMPUTER DESIGNATION	DRAFTED BY
PROJECT# 1288 013648941042-04e08/12/25/0001-093/1.3465	at 15:42 by cdb

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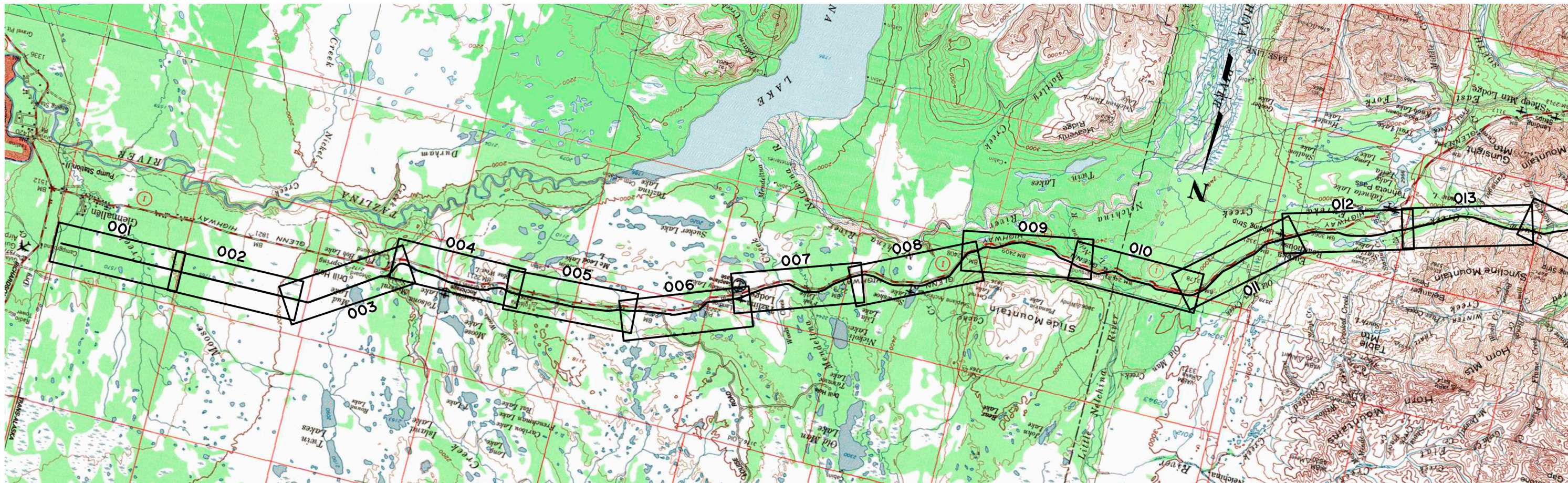
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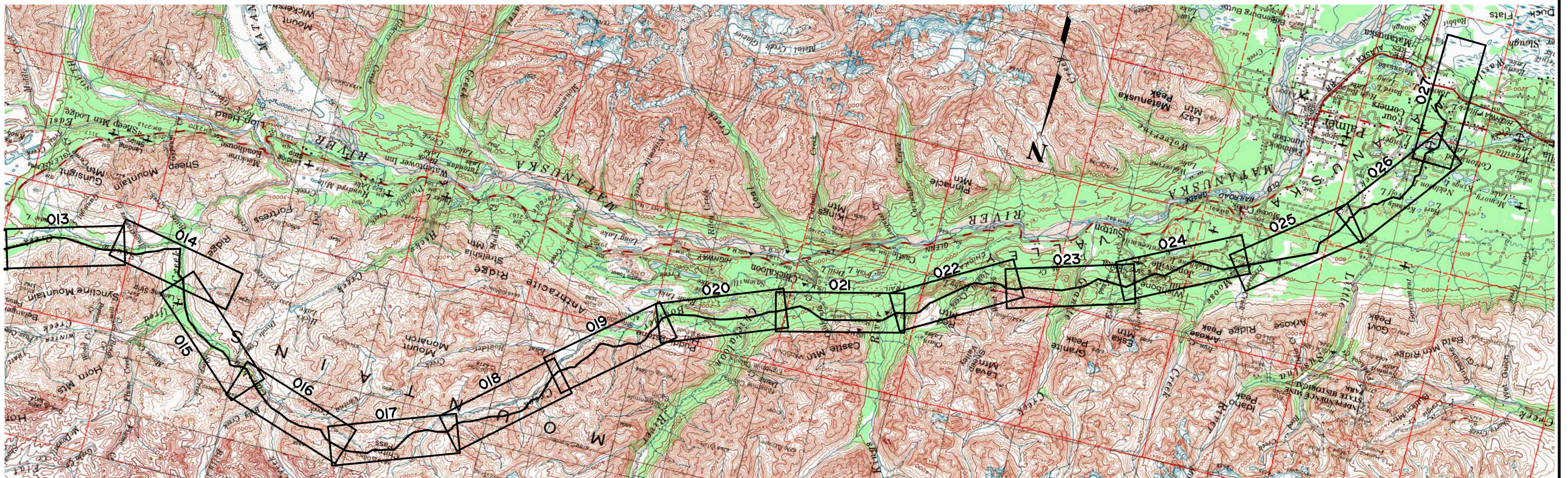
## ROUTE INDEX DRAWING



Note: The alignment as shown is based on the March, 2005 alignment.

[illegible]

## ROUTE INDEX DRAWING



Note: The alignment as shown is based on the March, 2005 alignment.

I	10/05	FINAL SUBMITTAL	PKH	CHR	JWR ODO
O	9/05	DRAFT SUBMITTAL FOR REVIEW	PKH	CHR	JWR ODO
No.	DATE	REVISIONS	BY	CHKD	APP CUST

# ALASKA NATURAL GAS DEVELOPMENT AUTHORITY



NATURAL GAS PIPELINE

### ROUTE INDEX DRAWING

GLENNALLEN TO PALMER SPUR LINE

SCALE IN FEET		DRAWING NO.	REV.
		INDEX 2 OF 2	1



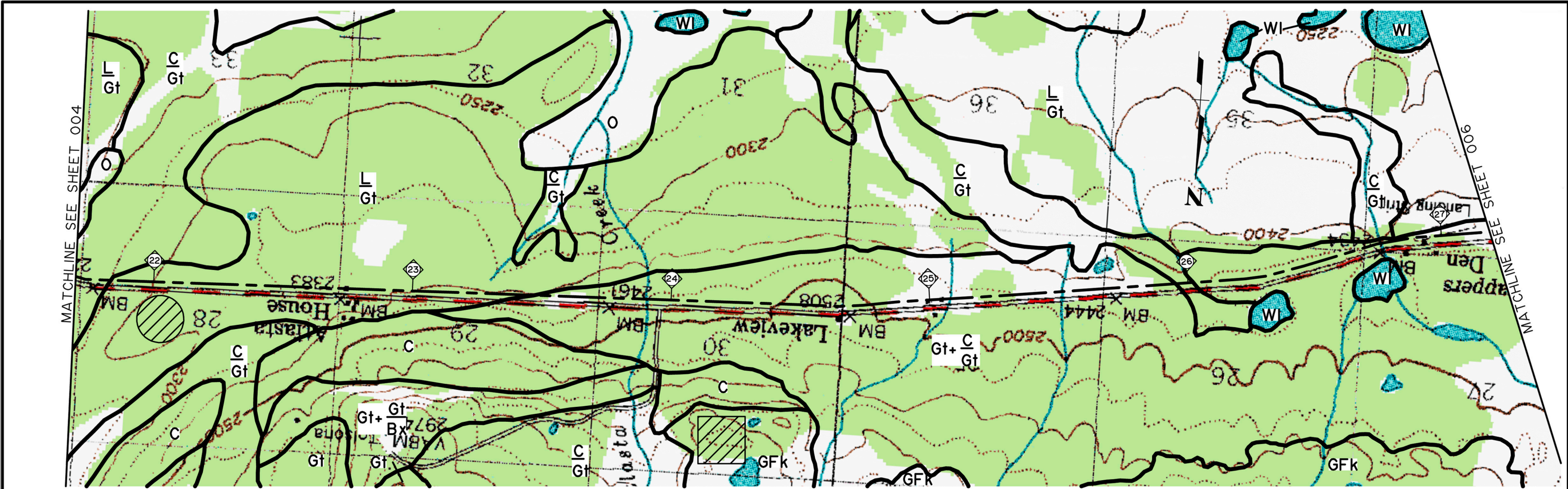






DESIGNED BY  
CHECKED BY  
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PROJECT DESIGNATION  
SPEIFICATIONS  
STANDARDS  
COMPUTER DESIGNATION

XREF: 1291--AIRPHOTOS, 1291--BD02, 1291--USGS--IMAGE, SID



TERRAIN UNIT	C/Gt	L/Gt	Gt+C/Gt	C/Gt	Gt+C/Gt
BEDROCK	Qu	CONGLOMERATE (UNDIFFERENTIATED)	Qu		
HAZARDS					
PERMAFROST		GF			
COMMENTS		ATLASTA CREEK XING		TEX SMITH LAKE DRAINAGE XING	
POTENTIAL MATERIAL SITES		MP 24.I			
PROPOSED DISPOSAL SITES	MP 22.I				

TERRAIN UNIT SYMBOLS/NAMES

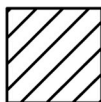
- Bx Bedrock  
C Colluvium  
Cf Colluvial Fan Deposits  
Cl Landslide  
Cs Solifluction Deposits  
Ct Talus  
El Loess  
Es Eolian Sand  
Ffg Alluvial Fan (Granular)  
Ffs Alluvial Fan (Fine-Grained)  
Fp Floodplain (Granular)  
Fpf Floodplain (Fine-Grained)  
Fpt Terrace  
GL Glacial Lacustrine (glacial lake) Deposits  
Gt Glacial Till  
GF Glacio Fluvial (meltwater) Deposits, Undifferentiated  
Gfo Outwash Deposits  
Gfe Esker Deposits  
GFk Kame Deposits  
GfI Lowland Glacio Fluvial (meltwater) Deposits  
Ht Mine Tailings  
L Lacustrine Deposit  
Lt Lacustrine Thaw Basin/Lake Deposits  
Me Marine Estuarine Deposits  
O Organic Deposits  
Vm Mud Volcano  
WI Water (Lake)

TERRAIN UNIT EXPLANATION

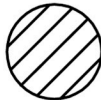
Layered terrain unit:

Organic Deposits overlying Glacial Till Deposits

O/Gt



Potential Material Site



Proposed Disposal Site

PERMAFROST CLASSIFICATIONS

- GA Generally Absent  
S Sporadic  
D Discontinuous  
GF Generally Frozen

Mosaic terrain unit, dominant component listed first:

Floodplain Deposits and Fluvial Terrace Deposits

Fp+Fpt

Complex terrain units:

Bedrock and Colluvial Deposits overlying Bedrock

Bx + C/Bx

Milepost

Note: The alignment and mileposts shown are based on the March, 2005 alignment.

No.	DATE	REVISIONS	BY	CHKD	APP	CUST
I	10/05	FINAL SUBMITTAL	PKH	CHR	JWR	ODO
O	9/05	DRAFT SUBMITTAL FOR REVIEW	PKH	CHR	JWR	ODO

ALASKA NATURAL  
GAS DEVELOPMENT AUTHORITY



LIMITATIONS

This map is intended only for general planning purposes. There has been no field verification of the interpretation other than recourse to published and unpublished maps and reports. Detailed design will require site-specific data including additional on-site investigation to verify terrain units, their characteristics, and their geotechnical properties.

NATURAL GAS PIPELINE

ROUTE SOIL CONDITIONS

GLENNALLEN TO PALMER SPUR LINE

SCALE IN FEET

0 500 1000 2000 3000

DRAWING NO.

005

REV.

I